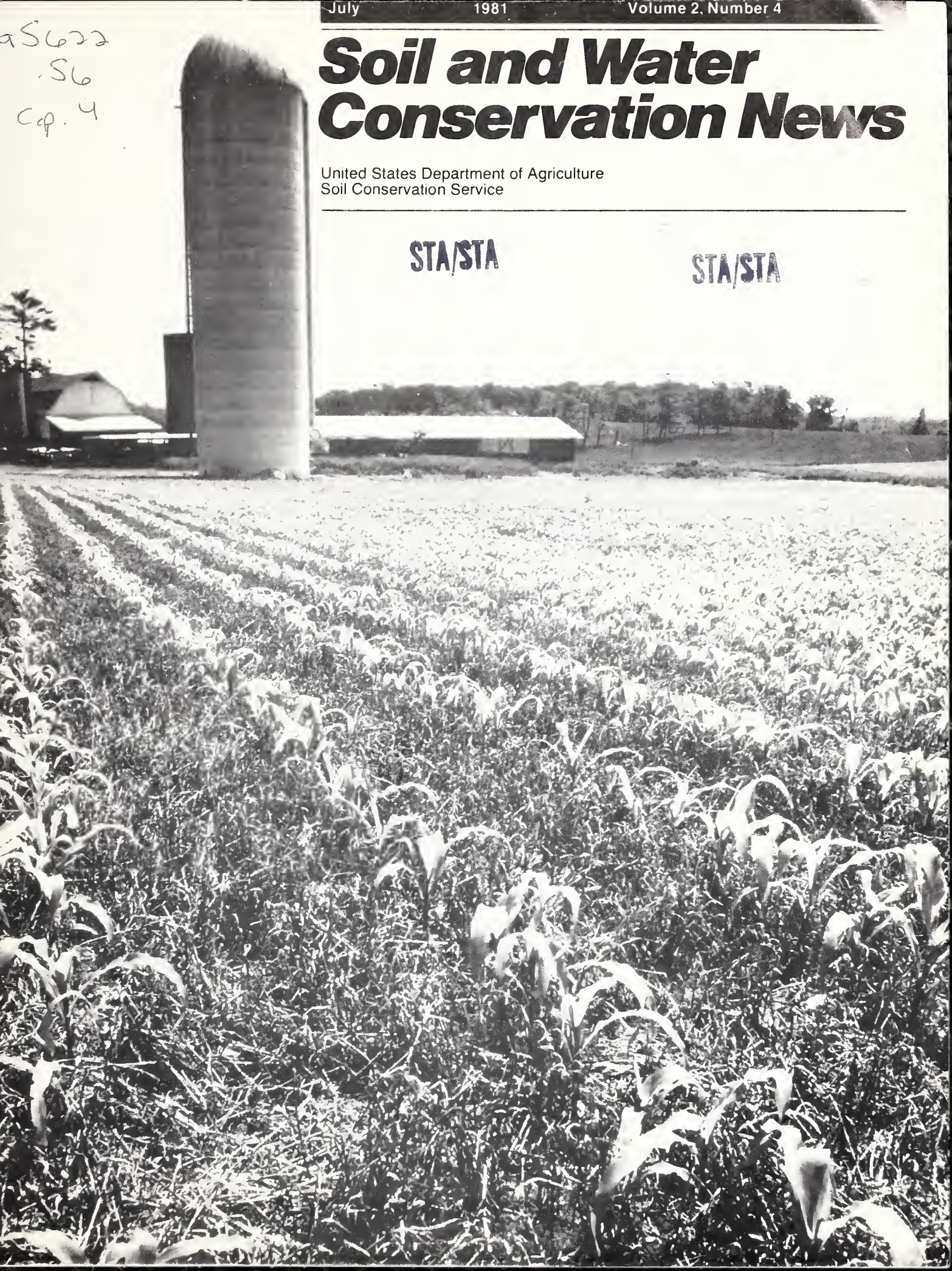
July 1981 Volume 2, Number 4

Soil and Water Conservation News

United States Department of Agriculture
Soil Conservation Service



Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1985. *Soil and Water Conservation News* (ISSN-0199-9060) is published 12 times a year. Controlled circulation postage paid at Washington, D.C.

Subscriptions
$10 per year, $12.50 foreign. Single copy domestic, $1.25; foreign, $1.60. Discounts of 25 percent on orders of 100 or more sent to the same address. Order directly from:

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U.S. Government Printing Office
Washington, D.C. 20402

Comments:

From the SCS Chief

Research is a major source of information in carrying out Soil Conservation Service activities. It is essential to maintaining our programs at the highest level of technical excellence. Therefore, SCS personnel need to be aware of research activities and results; identify the need for new soil and water conservation research and technology; coordinate research efforts; consult with research agencies and organizations to insure completeness and understanding in ongoing research; adapt research results to local situations; and make maximum use of pertinent research findings.

Research agencies, including both Agricultural Research and Cooperative Research of USDA's Science and Education Administration (SEA), have responded well to conservation research needs. Currently, we in SCS are making a concentrated effort to build even stronger relationships between SCS and SEA as well as other Federal, State, and private research agencies.

Steps we've taken to build up these relationships include establishing the position of research coordinator in the National Office to serve as liaison with research agencies and organizations. We've also strengthened our national research committee and research policy to better coordinate research activities and enable SCS to benefit fully from research findings.

Currently, eight SCS people are detailed to SEA to work on research projects of major importance to soil and water conservation. In addition, one SEA scientist has been detailed to SCS to assist with applying a model that relates land management to water quality.

In February in Madison, Wis., more than 100 scientists and conservationists met to identify national priorities in the use, management, and conservation of our soil and water resources. These representatives of the National Association of Conservation Districts and nine other professional societies, including 10 SCS specialists and representatives of other Federal and State agencies, named six critical research areas: sustaining soil productivity, developing conservation technology, managing water in stressed environments, protecting water quality, reexamining soil and water conservation policies, and assessing soil and water resources. These parallel closely the assessment of research needs made under the Soil and Water Resources Conservation Act of 1977.

SCS must work closely at all levels with researchers and with extension specialists in these areas, helping them with testing and applying research findings to sustain the productivity of our land and water resources. Only through teamwork can scientists, soil conservationists, and other specialists, farmers, and ranchers make research worthwhile.

Cover: Conservation tillage—shown here, corn planted in wheat stubble—is one of the erosion control methods to be studied at the National Soil Erosion Laboratory, which begins operations this summer. See interview beginning on page 3. (Photo, Tim McCabe, photographer, Information and Public Affairs, SCS, Washington, D.C.)

John R. Block
Secretary of Agriculture

Norman A. Berg, Chief
Soil Conservation Service

Prepared by Information and Public Affairs
Soil Conservation Service
U.S. Department of Agriculture
Washington, D.C. 20013

Editor, Judith E. Ladd

Associate Editor, Nancy M. Garlitz

Assistant Editor, Donald L. Comis

Editorial Assistant, Ann P. McQuitty

Design Consultant, Christopher Lozos

New Focus on Soil Erosion Research

This summer the new USDA National Soil Erosion Laboratory begins operations on the campus of Purdue University in West Lafayette, Ind. Its first director is William C. Moldenhauer, a soil scientist with wide experience in the Midwest and Great Plains. Shortly before the laboratory opened, Dr. Moldenhauer, who works for USDA's Science and Education Administration–Agricultural Research, was interviewed on his plans and research philosophy by Hubert Kelley, Soil Conservation Service director of information and public affairs.

Q– *In your view, how serious is soil erosion today in the United States?*

A– Erosion of croplands by wind and water is one of the biggest, most pervasive environmental problems in the country. Did you know that the topsoil from 40 acres of land is carried by the Mississippi River past Memphis every hour? Soil losses of this magnitude will ultimately lead to disastrous declines in crop yields, and long-term erosion will eventually destroy productive cropland.

Q– *What do you hope to find out at the National Soil Erosion Laboratory that you don't already know?*

A– There's a lot we don't know about soil erosion; the process is very complex. We want to find out exactly how rain and surface water flow detach soil particles and chemicals and how much shear force it takes. We're after the basic principles of soil erosion. Then we can use these principles to develop better ways to control erosion. This is all very basic, but it is badly needed.

Q– *Does basic research—like determining the amount of energy it takes to dislodge a soil particle—really do anything for the farmers?*

A– Basic research is where everything begins. You have to get some basic answers or you can't have innovation in conservation work. And you can't get the job done with 3-year grants. You have to have a stable, long-term organization of qualified people to work on these basic questions.

Q– *Will your work be limited to basic research?*
A– Not at all. We want to develop practical methods that a field technician can use in predicting erosion levels and in recommending effective control measures. We also plan to test new methods of controlling erosion under field conditions. Finally, we need to determine the economic consequences of erosion as it affects soil productivity and eventual land use.

Q– *Are we talking about research on a national level?*
A– Yes, especially of the basic research program. In the field program, there will be more emphasis on the Midwest. Other areas, such as the Palouse in the Northwest, Southern Mississippi Silty Upland and Delta, the Piedmont and Coastal Plain of the Southeast, and other areas in the Corn Belt, have onsite erosion research.

Q– *Exactly how does soil erosion cut down on productivity?*
A– For one thing, there is less plant-available water capacity in eroded soil. Subsoils don't release water as well as topsoil in most cases. For another, there are fewer plant nutrients in subsoil; you have to add more fertilizer to maintain yields. Erosion also degrades soil structure. Furthermore, erosion is not uniform, even within a field. People just can't believe it when you walk into a field and sample a 50-square-foot area here, and then go over and sample a 50-square-foot area there, and get a 30-percent difference in crop yields. But it happens all over. We're initiating a program this summer to get more data on this.

Q– *Then you know for a fact that soil erosion reduces crop yields?*
A– We *know* it—and farmers know it—but we have to develop more precise data on the relation of yield to erosion. We need it for various kinds of soils. We have to *prove* to the economists that erosion hurts production. Economists simply will not recognize the serious impact of erosion on yields until we give them some numbers to crank into their computers.

Q– *I don't understand why it has been so hard to prove.*
A– It's partly because the worst effects of soil erosion don't occur until the topsoil is gone, and that may take a long time. While it is happening, you get an average loss in yield of 3 bushels of corn per acre for every inch of soil lost. A loss like that isn't going to scare anybody much. But you can keep on losing topsoil on certain soils until the depth of profile for the rooting zone gets so shallow that you can't grow crops anymore. Maybe a little grass or red clover, but no more corn or soybeans.

Q– *Have you seen this happen?*
A– Oh, yes. And I've seen erosion reduce yields drastically in lots more places. You can look at some of the Marshall soils in high erosion areas of Iowa where the topsoil is completely gone. It used to be 8 to 12 inches deep.

Q– *What's that done to yields?*
A– Well, what is left of the Marshall soils is still a pretty good medium for growing corn, but there is moisture stress in the summertime and even when you pour on the fertilizer, you're not going to average more than 80 bushels of corn per acre.

Q– *Doesn't that worry the farmer?*
A– In a way. But in 1940, when there was still some topsoil left, that farmer—or his father—was only getting about 40 bushels of corn to the acre. Today, through use of improved varieties, fertilizer, and pesticides, the farmer is getting more than twice as much corn on less topsoil.

Q– *Then other inputs are masking the impact of the soil loss?*
A– Exactly. Now in 100 years, that farmer—or his grandchildren—may not be getting any corn at all, but it is awfully hard to get him excited about what's going to happen 100 years from now. You can do it in England, where some farms have been in the same families for hundreds of years, but hardly any of our farms have been in one family for even 100 years.

Q– *What has been the biggest setback to soil conservation in your lifetime?*
A– The worst blow to conservation was the switch to continuous row cropping. When I was growing up, the typical farming pattern in the Midwest was a corn-sod rotation. Sometime in the mid-1950's, farmers began switching to continuous crops of corn. It came on like a rampage, but it was several years before researchers—and SCS field people—realized that it

was here to stay. It's difficult to figure out what is a fad and what is a major change in farming, but it was 1960 before we admitted to ourselves that corn-sod rotations were a thing of the past over much of the Corn Belt.

Q– *Are they gone for good?*
A– Maybe not. Experimental plots growing continuous corn have been going at Purdue for many years. Experiments have shown significantly higher corn yields following meadow compared with continuous corn. This is thought to be due mainly to better aggregation which improves aeration and moisture relations. As structural deterioration becomes more acute, interest in corn-sod rotations may revive.

Q– *And then came soybeans.*
A– Yes, and instead of continuous corn, farmers today run a rotation of corn, soybeans, corn, soybeans. We didn't see that big export market coming for soybeans, of course.

Q– *Aren't soybeans harder on the soil than corn?*
A– Yes. Following beans, soil is more subject to erosion.

Q– *Why?*
A– We have several projects under way to find out. But we have some clues. The difference in amount of residue is one important reason. Soybean residue, both top growth and roots, is about one-third that of corn. But there may be other factors. Soybeans "mellow" the soil; they alter the tilth, loosen up the particles. And then it will wash or blow more easily than soil that has just grown a crop of corn.

Q– *Do you foresee soybean acreages increasing much more?*
A– No. They've probably gone about as far as they will go for the present. This is due mainly to the strong demand for corn. The total acreage of corn and soybeans has stayed pretty constant in the Corn Belt. The ratio of corn to beans, which is about 50–50 now, could change if the price of either of these crops changed significantly in relation to the other. With today's situation what we need is a good conservation system that farmers will accept to control erosion on a corn-beans rotation.

Q– *Don't you think farmers will accept new systems if they control erosion effectively?*
A– It depends. After 25 years in conservation research, I've learned that you can develop the best system in the world, but that development is a small part of your work. The system won't be acceptable to farmers unless it fits their way of doing things—with their available time and their approach to farming. It's a new ball game today.

Q– *For example.*
A– I know young men who graduate from Purdue and start out the next day farming 1,000 acres or more of family land. At tillage time, they work from dawn until after dark—sometimes 20-hour days. They don't have time to visit or discuss the fine points of terracing. Today's conservation system has to fit that kind of life.

Q– *But how does a scientist determine the right direction for conservation research? How does he know what will be acceptable?*
A– He doesn't; he has to give new ideas a fair trial. When I started out in Iowa in 1957, there was zero acceptance of no-till and other surface residue systems. Everybody was moldboard plowing; nobody was even chisel plowing. Today, less than half the farmers in Iowa use a moldboard plow. On the other hand, some technical people, including myself, have argued against chisel plowing as the best conservation tillage practice. They insist that there are better systems for preventing erosion, like ridge planting no-till. But farmers won't buy it; they keep right on chiseling.

Q– *Why is that?*
A– Three reasons. Some soils seem to give better yields when fall tilled. A farmer can go in right after harvest and cover a lot of ground with a chisel plow on these soils. Also, he can put anybody on a chisel plow and point him in the right direction and he can get a lot of acres done by dark. So farmers like to chisel and they feel it gives them a measure of erosion control. . . and it often does. Like so many conservation practices, it depends on how you do it and what you do for secondary tillage.

Q– *What's the wrong way to chisel?*
A– You can use chisel implements—like sweeps or straight shanks—that will leave more than 80 percent of the residue on the surface of the ground. That's good. But then it gets snowed on and rained on and plastered to the ground and you come in with a disk or field cultivator and cut that

residue cover down to 40 percent. Then you disk it again and cut it to 20 percent. Then you apply herbicide and you're down to 10 percent. While this does give some protection, since residue is near the surface, it isn't that much better than moldboard plowing. We have to convince the farmer that he has to leave a significant amount of residue on the surface of the ground to get erosion protection.

Q– *So far, what is your best hope for controlling erosion?*
A– Conservation tillage—all the surface residue systems—are about the only thing we have going for us, and they are going very well. But you can't expect miracles from them. If a farmer has slopes of more than 4 percent and insists on planting them to row crops, it will take terraces plus surface residue systems to protect the soil.

Q– *How about no-till?*
A– A farmer who goes no-till in growing corn can often farm slopes as steep as 15 percent without exceeding the soil loss limit of 5 tons per acre per year. Usually he leaves vegetated strips or terraces above and below a strip maybe 150 feet wide. He uses a sod-corn rotation. After a year or two of corn, he reseeds that strip to meadow. If he doesn't grow corn too frequently, he can protect that land.

Q– *Do you see surface residue systems continuing to expand?*
A– Absolutely. We still have some questions to answer about no-till and other systems, but we are well on the way to doing that. The support isn't unanimous yet, but in many places a farmer today can get cost-sharing on surface residue systems—both Agricultural Conservation Program money and State funds. This is a good sign, and should spark a lot of interest among farmers.

Q– *What else looks promising in erosion control?*
A– We may have to go back to cover crops like rye or other annual grasses to protect Corn Belt soils, particularly when we grow soybeans. This may be the only way to get enough ground cover to protect the soil.

Surface residue systems, according to Dr. Moldenhauer, are our best hope for controlling erosion, but there are still unanswered questions about no-till and other systems.

Q– *Anything else on the horizon?*
A– There may be substitute ways to increase soil stability besides putting the residue back. There are chemicals . . . and biological methods. Nobody has been doing much research on these alternatives in recent years, but they are worth a new look.

Q– *Do you think we need a new ethic of soil stewardship to which farmers can subscribe? Would this help get more conservation on the ground?*
A– I think farmers already want to conserve soil, to protect their land. But the success or failure of soil conservation will be determined in terms of economics, not ethics. A farmer on the verge of bankruptcy probably puts new terraces pretty far down on his list of priorities. On the other hand, if society wants farmers to practice conservation, then society should pay its fair share of the cost of getting the work done. Our problems won't be solved by preaching to the farmer and telling him what *ought* to be done. He already *knows* what ought to be done; what he needs are the time and money and research information to do it.

Q– *In light of that, how do you see your job as a research scientist?*
A– I'll tell how I *don't* see it. I don't see myself as always knowing more than the farmer I'm supposed to help. I grew up with farmers; I'm a farmer myself. As a public servant, farmers help pay my salary. What I want to do is concentrate on research that they can apply and still stay in business.

CONSERVATION Research Roundup

Continuous Cropping of No-Till Soybeans Studied

When no-till soybeans are grown continuously on the same soil, there's a good chance yields may suffer. Dr. Robert Carroll, a plant pathologist at the University of Delaware's Agricultural Experiment Station, has been studying the relationship between tillage practices and root and stem diseases of soybeans.

Results from the past 3 years suggest that when they're grown repeatedly on the same ground, no-till soybeans have a higher incidence of Fusarium blight disease then do conventionally grown soybeans.

Fusarium blight is caused by a soil-borne fungus which can seriously reduce yields. In heavily infested fields, losses may run as high as 20 to 25 percent, says Carroll. More often they run around 5 to 10 percent. The disease easily represents a loss of 2 or 3 bushels an acre.

The scientist has been studying the incidence of disease in two major soybean varieties—Essex and Williams—grown under both no-till and conventional tillage after both wheat and barley. These are the two major cover crops used with no-till beans in this area. He plans to collect data from test plots at the university's Georgetown Substation again this summer.

Carroll says the jury's still out, but data he's collected so far show a trend toward a statistically significant higher level of Fusarium blight fungus on the roots and stems of plants grown in no-till, as compared to those grown under conventional tillage. He's also isolated the fungus more often in soybeans grown after a cover crop of wheat, rather than barley. Seedcoats of no-tilled soybeans from his test plots also showed higher levels of the pathogen.

Carroll considers Fusarium blight to be the main threat to soybeans in the mid-Atlantic region right now. "Other diseases like pod and stem blight or brown stem rot are present, but they haven't yet caused any serious losses like those we've confirmed from Fusarium blight," he says.

"I'm not condemning no-till," stresses the scientist. "It has many advantages. But you need to look closely at all aspects of any new practice. Depending on what we find out, it may mean that farmers growing no-till soybeans will have to think more carefully about the varieties they grow since use of resistant varieties is the best means of controlling a pathogen like Fusarium."

When Does Less Tillage Pay?

Agricultural economists and agronomists at the Ohio Agricultural Research and Development Center took a close look at costs and benefits of reduced tillage and control of water pollution. They report that reduced tillage systems could be used on the majority of the Ohio soils with no change or a slight increase in net farm income while soil loss and agriculture's contribution to water pollution could be cut by half or more.

The study showed that net incomes would be likely to increase with reduced tillage on 35 percent of Ohio's cropland that is moderately well to well drained. On another 25 percent of the State's cropland which is somewhat poorly drained, reduced tillage would be economically viable with careful management. On about one-fourth of the cropland that is poorly drained, reduced tillage practices could be economically advantageous if subsurface drainage was provided and proper production practices followed. The remainder of the cropland is not suited to reduced tillage, and net incomes would be likely to suffer from its use.

A decade ago, reduced tillage was rare in Ohio. Now, research indicates that some form of reduced tillage is used on one-fourth of the corn and soybean acreage.

Developing Super Forage Grass

A system has been developed to enable plant scientists to efficiently raise large numbers of plants and screen them for genetic differences in growth response to environmental factors. Differences in the ability of plants to absorb and utilize mineral nutrients from their rooting medium has been recognized for many years. Now, in line with energy conservation efforts, environmental protection policies, and escalating crop production costs, agricultural researchers with USDA's Science and Education Administration–Agricultural Research, in cooperation with the Texas Agricultural Experiment Station, are seeking better ways to evaluate these differences as one viable alternative

to an ever-increasing use of chemical fertilizers—the traditional means of improving crop growth on low fertility soils.

Research is also being expanded to identify plant genotypes more tolerant of excesses of mineral elements, such as aluminum, manganese, and iron, which cause plant toxicity problems in soils. A compact containerized system, partially developed for growing large numbers of forage grass seedlings for use in automatic machine transplanter research, was adapted as the basis for a technique to screen variability in individual plant growth response to levels of mineral nutrient availability. Several trials were made with 100-plant samples of Kleingrass-75 to test the system. Results of these trials showed that differences in nutrient use efficiency could be identified and verified by laboratory analysis. Plants could be maintained in vigorous conditions during several harvest periods, and those selections that were retained could be easily transplanted for further propagation and evaluation.

The utility of this screening technique will be further evaluated by testing crosses made from selections in the series of tests. Shifts toward increased nitrogen and/or phosphorus use efficiency will be studied. The eventual goal of such research is to identify those factors contributing to improved nutrient use. This type of information should provide a sound basis for selection and breeding of plants which have lower and/or more tolerant nutrient requirements.

Cool Season Annual Clovers

Cool season annual clovers are an important part of U.S. Gulf Coast pasture systems because they extend the grazing season, utilize atmospheric nitrogen, and produce high-quality forage. Cultivars of arrowleaf, crimson, and subterranean clovers were compared for germination, seedling growth, estimated nitrogen fixation, and dry matter production under Gulf Coast conditions.

Scientists with the Texas Agricultural Experiment Station made germination tests with 12-hour light and dark periods under day/night temperature treatments of 35/25, 30/20; 25/15, 20/10, and 15/5° C. Crimson clover had good germination across all temperature treatments and had the fastest germination rate followed by subterranean and arrowleaf. Subterranean clover germination was depressed only at 35/25° C with the best germination rate at 30/20° C. Temperature treatments of 30/20 and 35/25° C severely depressed arrowleaf germination to only 17 and 9 percent, respectively. Seedling weight, leaf number, and nodule number were compared; by 7 weeks, subterranean seedlings had twice as many leaves as arrowleaf, with crimson intermediate. Nodule number ranking was subterranean greater than crimson, which was greater than arrowleaf.

Estimated nitrogen fixation averaged over 2 years on two soil types for crimson, arrowleaf, and subterranean clover were 57, 73, and 105 kgN/ha, respectively. Crimson and arrowleaf nitrogen fixation was reduced 50 to 61 percent on clay soil. Dry matter production on fine sandy loam soils was quite variable from year to year depending on rainfall distribution during the growing season. Usually arrowleaf production exceeded or equaled subterranean clover, with crimson always lowest because of earlier maturity. On poorly drained clay soils, subterranean clover produced 60 percent more forage than arrowleaf and crimson clovers.

Faster seedling growth and earlier germination of subterranean and crimson clovers indicate they would be the easiest to establish and most competitive in grass mixtures. Arrowleaf clovers are the most difficult to establish because of the limited temperature range for optimum germination and the poorest seedling growth. All species were productive on sandy loam soil, but subterranean clovers were superior on clay soil.

Nonpoint Source Pollution

Ohio Agricultural Research and Development Center scientists are cooperating with USDA Science and Education Administration-Agricultural Research scientists at the North Appalachian Experimental Watershed in Coshocton County to determine the role of livestock in water pollution.

Results thus far indicate that chemical concentrations of nitrogen and phosphorus, two major sources of water pollution, in the surface or ground water from summer pastures are within recommended limits of acceptable water quality standards.

Concentrating animals in pastures for winter feeding resulted in

increased surface water flow with some runoff. Chemical concentrations have not been sufficient to greatly impair water quality. Researchers say, however, that safeguards may prove necessary to allow wintering areas to remain sod covered to reduce runoff. This could be achieved through rotation of feeding areas, spring overseeding for better plant cover, and use of grass filterstrips between the winter feeding area and any stream receiving runoff.

The gaged pasture watersheds at the Coshocton Hydrologic Station provide an excellent site for these studies on nonpoint source pollution.

Trees and Weeds

Survival and growth of both Fraser fir and Scotch pine seedlings were significantly affected by weeds in studies by Ohio Agricultural Research and Development Center foresters in Wooster, Ohio. Seedlings were largest on plots kept completely free of vegetation by scalping and cultivation and were about 10 percent smaller on areas where vegetation was controlled by herbicides.

When broadleaf weeds competed with the trees, survival of the seedlings was reduced by 40 percent and growth by 50 percent. Where grass competed with the trees, survival was reduced by more than 40 percent and tree growth was 60 percent less than on areas where vegetation was controlled. Fraser fir was more seriously affected than Scotch pine in the study.

Mine Spoil Revegetation

Researchers at New Mexico State University (NMSU) have completed a 5-year test of grasses grown on mine spoil. Only one species of 34 tested survived.

Dr. Ferdinand Quinones and Dr. Walter Gould, agronomists with NMSU's Agricultural Experiment Station, tested 2,061 plots of perennial grasses, forbs, and shrubs from 1975 to 1979. All were planted in plots containing several inches of sandy topsoil over mine spoil.

The agronomists were looking for plants that would provide ground cover to prevent wind and water erosion on reclaimed land.

In the first test year, the researchers planted 94 entries of indian ricegrass and 95 of black grama grass, as well as several other species. They evaluated the plants for density and vigor in early fall.

Each succeeding year the researchers added new selections to the plantings from the previous trials. New seedings were irrigated to get the plants established; but after the first year, irrigation was limited or eliminated. Thus, the plantings received less water each year until the last year when only the 1978 plantings received irrigation.

When the 1975 and 1976 seedings received irrigation, there were no problems obtaining or keeping a stand. However, when irrigation was stopped and the plants had to survive on the 3 or 4 inches of rainfall received during the growing season, only the more drought-resistant entries survived.

Quinones says that of the 5 years of testing, the 1975 test group gave the best measure of performance under harsh conditions. These plantings had adequate moisture during the first two growing seasons but not during the last 3 years.

By 1979, the reduction of irrigation water proved fatal to all entries of indian ricegrass. The black grama selections were unable to survive well enough for revegetation purposes.

The lone survivor was alkali sacaton. As its name implies, it thrives in alkaline soils. It can be found in bottomlands and flats and on sandy plateaus and washes.

Green alkali sacaton is suitable for livestock forage and provides erosion control. Its density ranged from high to moderate through the 5 years. Fourwing saltbush, galleta, and blue grama performed moderately well in these tests during the first 2 or 3 years, but were not as satisfactory as alkali sacaton.

Worms Rebuild Soil

Ohio Agricultural Research and Development Center forestry scientists report that studies initiated in 1967 show that introduction of earthworms on stripmine spoils can greatly aid in the incorporation of organic matter into the spoil material.

Earthworms removed more than 90 percent of leaves of European black alder from the spoil surface—but only about 50 percent of black locust leaves were removed.

SCS Grows Guayule

by Nancy M. Garlitz

Soil Conservation Service plant materials specialists in California, Arizona, and New Mexico are testing the propagation and culture of guayule (pronounced wy-oo-lee). Although guayule sounds like something cowboys shout at rodeos, it is really a small desert shrub that could become an alternative source of natural rubber for the United States and the world.

The guayule plant (*Parthenium argentatum*) is native to the desert of southwest Texas and northern Mexico. A member of the sunflower family, it is a hardy woody perennial shrub with silver-gray leaves. The rubber in the plant forms in cellular tissues under the bark of the roots, stems, and branches. Guayule usually grows to about 3 feet in height and thrives in subtropical-temperate climates, where rainfall is low and erratic.

SCS is cooperating with USDA's Science and Education Administration (SEA) and other Federal, State, private, and international agencies in evaluating guayule seed for large-scale production in the Southwest. SEA provided the seed for the SCS propagation trials.

The plant materials centers (PMC's) in Lockeford, Calif., Tucson, Ariz., and Los Lunas, N. Mex., began testing guayule this spring. Seed was planted outdoors in nursery beds and in greenhouses.

Wayne Everett, SCS staff plant materials specialist in Washington, D.C., says, "Scientists at the PMC's are recording how long it takes the guayule seeds to germinate; any problems with insects or disease; what kind, how much, and when fertilizer is applied; how much and when water is applied; the amount of light the plants receive; and how long it takes plants to reach certain growth stages and develop adequate root systems." Irrigation needs are also being evaluated.

Extracting rubber from guayule shrubs is not a new idea in the United States. In the early 1900's, guayule became a source of natural rubber for more than a dozen factories in Mexico and Texas. By 1910, about half of all U.S. rubber came from wild guayule shrubs. But the extensive wild stands were soon depleted and the country went back to the

Above, squeeze it, twist it, stretch it: This cross section of deresinated guayule rubber has the same physical and chemical characteristics as rubber from the Hevea tree, at present the only significant natural source of rubber. At right, SEA Chemist Stephen M. Poling sprays a "bioregulator" on guayule plants. The bioregulator increases the plants' rubber production 2 to 6 times.

more cost-efficient process of extracting rubber from the Hevea rubber tree which is still the main source of natural rubber in the world today.

During World War II, an experimental study called the Emergency Rubber Project spent $30 million and planted some 32,000 acres of guayule in the Salinas Valley of California. The project produced 3 million pounds of rubber but was dropped when synthetic rubber was developed. By that time though, a wealth of information had been gathered on the plant.

Several things have sparked the current interest in guayule production: the demand for more natural rubber in the United States for producing radial tires, which require more natural rubber than standard types, and for producing aircraft tires, which require 100 percent natural rubber; the rising cost of petroleum used in making synthetic rubber; the chance of political, economic, or biological changes affecting the supply of Hevea coming from Southeast Asia, our main supplier; a dwindling supply of natural rubber in the Nation's strategic stockpiles; and the realization that guayule could be grown successfully on many lands where the supply of irrigation water is insufficient for the successful production of most agricultural crops. "In some areas of the Southwest, growing guayule could improve environmental and economic conditions and result in more efficient use of the land," says Howard Tankersley, SCS director of Land Use.

Guayule grows in areas that support little or nothing else. Some of that land is the home of American Indians sorely in need of the opportunities that a new industry, especially an agronomic one, could provide.

Since the 16th century when the Spaniards first saw the Aztec Indians chew guayule bushes to extract rubber and make balls with it for the games they played, guayule has bounced in and out of the industrial limelight. Maybe it will soon be here to stay.

Nancy M. Garlitz,
associate editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

The guayule plant and products: At the center of the photo is the shrub. Clockwise from bottom, center, are seeds; rubber, no resin removed; shrub, shredded and ready for rubber extraction; rubber, resin removed; front nose tire of a Navy jet; sections of the jet tire recapped with guayule; and two samples of compounded guayule rubber ready for tire recapping.

News Briefs

OPM, SCS to Study Conservationist and Technician Positions

The Office of Personnel Management (OPM) and USDA's Soil Conservation Service (SCS) began a formal study this year to decide whether it will be possible to combine the Soil Conservation Technician Series (GS-458) with the Soil Conservation Series (GS-457) to permit better utilization of personnel.

More than half of the SCS work force is in these two series: about 4,500 soil conservationists and more than 2,300 soil conservation technicians. Most of these technicians are classified as GS-6 or lower, none higher than GS-7.

"The purpose of combining these series would be to remove the limitations on the technicians and allow them to advance as far as their ability will take them," said Ken Novak, SCS Director of Personnel.

The current qualification standards for the soil conservation series, issued in 1970, require either a bachelor's degree or at least 30 semester hours in natural resources or agricultural fields. OPM and SCS will consider substituting experience requirements for part of these education requirements.

In April, two OPM employees began interviewing SCS employees whose jobs are in either series. The study should be completed by December 31, 1981. If OPM and SCS recommend that the qualification standards and the classification standards be changed, and USDA's Office of Personnel agrees, the agencies would change the standards by October 1, 1982.

There are many problems to be overcome, especially the college education requirements, and the agencies may decide that the two series cannot be combined.

If the series are combined, other similar series—such as forester/forestry technician and biologist/biological technician—might also be combined eventually.

"We've got to get with it, to get these standards written to fit the social and technical needs of the 1980's," Novak said. "We want to recognize the role soil conservation technicians play in the total conservation program and make sure they are adequately paid for it."

Donald L. Comis,
assistant editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

RCWP—Off to a Good Start

Over the past 10 years, water quality in St. Albans Bay, Vt., has deteriorated to the extent that this once popular scenic attraction along the shores of Lake Champlain poses a health hazard and is unfit for recreational purposes. An alltime high of 80,000 annual visitors to the bay has dwindled to under 6,000. According to a study conducted in 1978 by the Franklin County Natural Resources Conservation District, 76 percent of the problem—an influx of nutrients, particularly phosphorus—lies with the city's sewage treatment system. The remaining 24 percent comes from agricultural runoff. Studies are underway to determine the alternatives for managing the wastes from the municipal sewage plant. The U.S. Department of Agriculture's Rural Clean Water Program (RCWP) will address the agricultural pollutants problem.

One of the 13 projects approved during the first year of the program and one of 3 selected for comprehensive monitoring, this RCWP project was allotted more than $1,200,000 to be made available for cost sharing through USDA's Agricultural Stabilization and Conservation Service. Under the program, farmers in the watershed are eligible to receive cost sharing and technical aid from USDA in order to carry out specific farming practices recommended as most effective for pollution control. Given priority on a "worst first" basis, individual plans are drawn up by the Soil Conservation Service and serve as the foundation for contracts, ranging from 3 to 10 years. The majority of these cost-shared practices are on a 75/25 ratio, with the farmer paying 25 percent of the cost.

Of the more than 100 farmers in the watershed, more than 50 have currently signed up for participation in the program. The goal is to have 64 conservation contracts in effect by 1983. As practices are installed, their effect on improving water quality will be closely monitored.

Ann Dudas,
public information officer, SCS, Burlington, Vt.

Much of West to Have Limited Summer Water Supply

Water supplies will be limited, possibly severely, for much of the West this summer, according to the season's final report issued by the U.S. Departments of Agriculture and Commerce. Streamflow will be very low throughout much of the West this summer.

Norman A. Berg, chief of USDA's Soil Conservation Service, said that irrigation water supplies will be limited in most localities. Water shortages should be expected where supplemental reservoir storage is not available. The National Weather Service of the Commerce Department's National Oceanic and Atmospheric Administration, warns that if the summer weather is not unusually wet, many of the West's reservoirs will be severely depleted by heavy demands during the 1981 irrigation season.

Surveys carried out the first of May revealed very poor mountain snowpack conditions. Many rivers had already reached their spring peaks and had begun to recede as much as a month early, Berg said.

The central Rockies—the headwaters of the Colorado, South Platte, and Arkansas basins—are expected to experience near minimum streamflow.

The Soil Conservation Service surveys snowpack and monitors snowmelt at about 1,600 sites throughout the West and Alaska each month from January through May. The agency and the National Weather Service jointly analyze the data and compute forecasts of runoff for the summer snowmelt season.

The forecasts are based on the assumption that weather for the remainder of the season will be near normal. Snow accumulated during winter and spring provides about 75 percent of the western water supply during the year.

Timely summer rains can offset the impact of forecast streamflow shortages but are not expected to have a major effect on river runoff volumes.

High Erosion Rates Threaten Soil Productivity

Each year, more than 6.4 billion tons of soil erode from the Nation's farmland and other nonfederal lands.

"In many areas, the rate of erosion seriously threatens long-term agricultural productivity," said Norman A. Berg, chief of USDA's Soil Conservation Service. "We have unacceptable erosion rates on more than 140 million acres of cropland."

Berg said erosion rates exceed acceptable levels on more than 295 million acres of cropland, pastureland, forest land, and rangeland. Scientists consider erosion tolerable when eroded topsoil can be replenished through natural processes.

Of the more than 6.4 billion tons of soil losses from wind and water erosion each year, more than 5 billion tons erode from agricultural land, Berg said. Some 1.1 billion more tons erode from streambanks, gullies, construction sites, roads, and roadsides.

Sediment, the greatest single water pollutant by volume, is an end product of soil erosion, Berg added.

Aquaculture Report Issued

The growing demand for fish and seafood in the United States has prompted the U.S. Department of Agriculture's Economics and Statistics Service to release a new report that gives economic data on aquaculture and analyzes the supply, demand, and price factors affecting the industry.

The report, titled "Aquaculture Outlook and Situation," will be published twice a year, in April and October.

A companion report includes catfish and trout sales for 1980, as well as their commercial inventories as of February 1, 1981.

According to the report, aquaculture is providing additional agricultural revenue and jobs in some regions. It accounts for a significant portion of the U.S. supply of catfish, trout, crayfish, oysters, and salmon.

Copies of "Aquaculture Outlook and Situation" are available from Economics and Statistics Service, U.S. Department of Agriculture, Room 0054-S, Washington, D.C. 20250. Copies of the companion report are available from room 0005-S, at the same address.

Sharon R. Boyd,
contributing writer, Information and Public Affairs, SCS, Washington, D.C.

Management Tips

Readers are invited to submit "Management Tips" to the editor, *Soil and Water Conservation News*, Soil Conservation Service, P.O. Box 2890, Washington, D.C. 20013.

Conservation Programs for Rural and Urban Needs

A budget increase from $2,300 to almost $100,000 in 8 years—that sounds like big government instead of a soil conservation district. But that's just part of the story of the Hinds County Soil and Water Conservation District (SWCD) at Jackson, Miss. During the same period, the district staff has increased from one part-time employee to five full-time employees to work with the three Soil Conservation Service employees assigned to the district.

The Hinds County SWCD has more than 560,000 acres. Almost one-half million acres is in agriculture use. The agriculture workload plus the challenge of working with over 250,000 people in the capital city area of Jackson presented a unique opportunity for the district.

Jack Lilley, chairman of the district board, said it this way, "In the early seventies when we began a serious effort to work with units of government and urban people, we knew that we must seek new methods of support for the district. SCS provided us with three very fine employees, but we had to have additional technical assistance in order to expand our program and serve all the people of our district.

"We looked at our needs and our resources and began to develop a plan for expansion," Lilley explained. "Our first move was to appoint five deputy commissioners. These were men involved in urban activities and men who could influence city hall and county government."

In 1974, the Hinds County Board of Supervisors agreed to levy one-sixteenth of a mill for the district. (A mill is one-tenth of a cent. State law allows for the collection of tax up to one-half mill for a conservation district.) This millage brought in more than $25,000 and allowed us to have two full-time employees. In 1977 the millage was increased to one-eighth mill and with the increase in the tax base we received more than $65,000. Last year the income from the county tax was more than $80,000. In addition to this, the city of Jackson provides $5,000 per year to the district. The annual membership drive brings in around $7,000 per year. Sponsorships of the district newsletter and other activities bring in the additional funds which amount to around $100,000 annually.

The SCS staff of the field office consists of a district conservationist, soil conservationist, and soil conservation technician. The district staff consists of a soil conservationist, soil conservation technician, education specialist, district clerk, and secretary. Both of these groups perform as a single team in assisting the district with a balanced conservation program for both the rural and urban areas.

In addition to the planning and application of conservation practices, the district conducts several information/education programs. The district newsletter, "Conservation Notes," is published monthly with a circulation of 2,400. The district owns and operates a darkroom for developing and printing pictures. An annual membership meeting is held each spring with an attendance of 300 or more. A conservation poster and essay contest is conducted annually. Each year more than 1,500 posters and over 200 essays are entered. These are judged by a group of teachers, and the winners are recognized at the annual meeting.

The district cosponsors three conservation education workshops each summer with Mississippi College and Jackson State University. Of the 126 teachers attending these workshops last summer, 33 were provided scholarships by the Hinds County SWCD. The funds for these scholarships plus other educational activities come from the membership drive conducted annually.

The district conducts several tours each year for teachers, youth groups, and others interested in conservation. The Hinds County SWCD and Farm Bureau cosponsor a tour each year for farmers, businessmen, and agriculture leaders. They charter a bus and travel to another State or States on a 4-day trip to study conservation. The 44 seats on the bus are always full.

Another activity sponsored by the district annually is "Tree Planting Week." During the week this year the district gave out over 40,000 trees to the more than 1,200 people who came by the district office. Also tree planting programs were presented to 40 groups of third grade students which consisted of over 2,500 students. Boy Scout troops, Brownies, and 4-H clubs assisted with the packaging of the trees for this program.

How has the Hinds County SWCD accomplished all of this? The number one factor has been strong leadership from the district board and this includes both the commissioners and the deputy commissioners. The board meets monthly and normally has 100 percent attendance. The district participates in all the activities of the

National Association of Conservation Districts (NACD) and the Mississippi Association of Conservation Districts. Several board members attend the State, area, and national meetings each year. In fact, this year six members of the board and five of the wives attended the NACD meeting.

With a strong local board it was easy to get support from local units of government, local people, and the news media. With all the local support we have, plus that of SCS, the Hinds County Soil and Water Conservation District will have an even better program in the future.

Jack H. Winstead,
district conservationist, SCS, Jackson, Miss.

Conservation District Pamphlet Tells Where to Find Help With Resource Planning

New River Soil and Water Conservation District directors in Virginia have published a pamphlet entitled "We Can Help!" to enable local citizens and resource planners locate technical help from the U.S. Department of Agriculture in a hurry. The pamphlet lists the local offices, phone numbers, and services of the Soil Conservation Service, Agricultural Stabilization and Conservation Service, Farmers Home Administration, Extension Service, and the Virginia Division of Forestry.

In a chart, services are divided into community facilities, housing, drainage, flood prevention, and resource development. Under resource development, for example, are listed soils information, reservoirs, forestry, geology, surface water supply, streams, lakes, and water bodies. The pamphlet covers Carroll, Patrick, and Grayson Counties, and the City of Galax.

New River district directors say that there is a wealth of resource information and technical assistance available from USDA and State agencies; people just need to know where to find it.

Two Conservation Films Available

Conservation Down on the Farm is a documentary film focusing on a dairy farmer in Cecil County, Md., and the help he received from the Cecil Soil Conservation District. The film explains how a landowner, the local soil and water conservation district, and cooperating agencies such as the Soil Conservation Service can coordinate efforts to control erosion and protect and improve water quality.

Many conservation practices are well illustrated and explained including diversion terraces, conservation tillage, grassed waterways, and contour stripcropping. Animal waste management is also explained along with the importance of controlling nonpoint source pollution.

Although the setting for the film is in Maryland, the principles and practices discussed apply nationwide. The film is an excellent tool for informing civic groups, local officials, farmers and farm organizations, students and educators, and others about the work of and help available from districts as well as about the principles of soil and water conservation.

The 20-minute, 16mm, color film was produced under a cooperative agreement between SCS and Stuart Finley, Inc. For more information about rental or purchase of the film, contact Stuart Finley, Inc., 3428 Mansfield Road, Falls Church, Va. 22041, or call (703) 820-7700.

Land Use—A Moral Dilemma was produced by the Land Utilization-Water Conservation Committee of the Shawnee Resource Conservation and Development Area (RC&D), Marion, Ill. The 36-minute film, narrated by Eddie Albert, looks at the Nation's agricultural production capabilities and reflects on past land use and resource attitudes.

The film discusses the current problem of the conversion of agricultural land through urbanization and to other uses and the continuing problem of excessive erosion. One technique used in the film is interviews with farmers who discuss the problems from their own perspective.

The film has been shown throughout Illinois, and television stations in Illinois, Missouri, and New Mexico have shown it to their audiences during prime time. It has been used in all 50 States and Taiwan, and is recommended for use by State land use committees. Sixty film prints have been sold at cost and the Shawnee RC&D has 16 loaner films available for use for return postage only.

For a brochure describing the 16mm, color film or for additional information, contact the Shawnee Resource Conservation & Development Area, 1305 Yale Ave., R.R. 6, Box 127-A, Marion, Ill. 62959, or call (618) 997-4415.

Meetings

July	3-6	National Audubon Society, Estes Park, Colo.
	15-18	The Izaak Walton League of America, Inc., Syracuse, N.Y.
	18-22	American Association of Nurserymen, Inc., Cincinnati, Ohio
	26-29	American Agricultural Economics Association, Clemson, S.C.
	26-30	National Federation of Business and Professional Women's Clubs, Inc., San Francisco, Calif.
	27-30	International Symposium on Urban Hydrology, Hydraulics, and Sediment Control, Lexington, Ky.
August	2-5	Soil Conservation Society of America, Spokane, Wash.
	2-6	Conservation Education Association, Swannanoa, N.C.
	16-19	American Institute of Chemical Engineers, Detroit, Mich.
	16-19	National Farm & Power Equipment Dealers Association, Atlanta, Ga.
	16-20	National Association of County Agricultural Agents, Ithaca, N.Y.
	18-20	Association of State and Interstate Water Pollution Control Administrators, Baltimore, Md.
	26-Sept. 6	11th Congress on Irrigation and Drainage, Grenoble, France
September	7-11	Federal Bar Association, Denver, Colo.
	13-16	International Association of Fish and Wildlife Agencies, Albuquerque, N. Mex.
	16-18	American Fisheries Society, Albuquerque, N. Mex.
	16-18	National Waterways Conference, Inc., St. Louis, Mo.
	20-22	World Fertilizer Conference, New York, N.Y.
	21-25	Association of Interpretive Naturalists, Inc., Estes Park, Colo.
	22-25	National Conference of Editorial Writers, Providence, R.I.
	24-28	American Horticultural Society, Boston, Mass.
	27-30	Society of American Foresters, Orlando, Fla.

New Publications

Research Digest 1980

by the Institute for Land and Water Management Research

This digest briefly summarizes the scientific research of the Institute for Land and Water Management Research in The Netherlands. It presents the 6 main fields of research of the Institute and follows this with summaries of 34 specific research topics the institute's scientists are studying.

The first two topics are descriptive research topics, the water supply of The Netherlands and a land survey of The Netherlands. The other topics involve a systems approach and include topics ranging from water management to land use to the economics of land and water management.

This book is available free from the Institute for Land and Water Management Research, P.O. Box 35, 6700 AA Wageningen, The Netherlands.

Review of Research on Salt-Affected Soils

by I. Szabolcs

This is a survey mainly of the research of the International Society of Soil Science Subcommission on Salt-Affected Soils, supported by UNESCO and the Food and Agriculture Organization. The first section reviews the worldwide mapping of salt-affected soils and includes maps of the continents and several countries. This book also reviews the role of environmental conditions in the formation of salt-affected soils and the prediction and prevention of secondary salinization and alkalization caused by irrigation. It has a 29-page bibliography on salt-affected soils.

This book is available for $21.25 plus State tax from Unipub, 345 Park Avenue South, New York, N.Y. 10010.

Recent Soil Surveys Published

by the Soil Conservation Service

California: Western Alameda County.
Colorado: Jackson County.
Connecticut: Fairfield County.
Florida: Leon County.
Georgia: Rabun and Towns Counties.
Indiana: Dearborn and Ohio Counties.
Iowa: Clinton County, O'Brien County, and Wapello County.
Kansas: Bourbon County and Montgomery County.
Kentucky: Lyon and Trigg Counties.
Nebraska: Clay County.
Oregon: Grant County.

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